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THE WIND PROFILE UP TO 600 METERS AT A FLAT COASTAL SITE; COMPARISON BETWEEN WRF MODELING AND LIDAR MEASUREMENTS

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Introduction

Approach

Main body of abstract

In order to map the wind field resource by use of numerical modeling as well as for short term forecasts, knowledge on the accuracy of the modeled wind speed at hub height is essential. Currently, mesoscale models are still representing best the surface parameters (mean temperature at 2 meter), while a number of applications (like air pollution and wind energy) need accurate wind profiles and boundary-layer heights. This study shows long-term ABL wind profile features by comparing long-range wind lidar measurements and the output from a mesoscale model. The study is based on one-year pulsed lidar (Wind Cube 70) measurements of wind speed and direction from 100 to 600 meters with vertical resolution of 50 meters and time resolution of 10 minutes at a coastal site on the West coast of Denmark and WRF ARW (NCAR) simulations for the same period. The model evaluation is performed based on wind speed as well as statistical parameters of the Weibull distribution of the wind speed time series as function of height. It is found that 1) the scatter of observations to model results of the wind speed does not change significantly with height between 100 and 600 meters; and 2) WRF is generally under predicting both the profiles of the measured wind speed and power density as well as 3) the scale (A) and shape parameter (k) of the Weibull distribution above 100 m. The latter signifies that the model suggests a wider distribution in the wind speed compared to measurements.

Conclusion